SMTC

SYSTEMS MANUFACTURING TECHNOLOGY, INC.

SERTECH

Instruction Manual

Copyright 1984

The SERTECH is a Serial interface card for the Apple II series computers. Before installing the SERTECH card, please read this manual thoroughly. Failure to do so can result in damage to the SERTECH, Apple or both.

1145 Linda Vista Drive • San Marcos, California 92069 • (619) 744-3590

Scanned by Mac84

TABLE OF CONTENTS

CHAPTER 1: Introduction.....1

I. Compatibility.....1

II. Firmware Options.....2

a) Carriage Return Delay.....3
b) Baud Rate.....4
c) Video Echo.....5
d) Parity Type.....5
e) Auto Line Feed.....6
f) Data Length.....6
g) Number of Stop Bits.....7

III. Polarity Jumper.....8

CHAPTER 2: Installation.....10

I. Turn Off the Power.....10

II. Connect Flat Ribbon Cable.....10

III. Insert Card in Apple.....12

IV. Plug In Device.....13

V. Power Up.....14

CHAPTER 3: Serial Data Communication.....15

I. Background.....15

II. Connector Pin Assignments.....15

III. Modems.....18

IV. The ACIA.....18

V. Signal Discriptions.....19

APPENDIX A: Troubleshooting.....20

SWITCH SETTINGS FOR SERTECH
USING THE
APPLE IMAGE WRITER 1 & 2

IMAGE WRITER II

Block 1	Block 2
off,off,off,off,on,off,off,off	off,on,on,on,off,on,on,on

Cable on P3
JP1 jumper, molex connector on top 2 pins.

IMAGE WRITER 2

Block 1	Block 2
off,on,on,on,on,off,off,off	on,on,on,on,on,on,on,on

Cable on P3,
JP1 jumper, molex connector on top 2 pins

Setting for 9600 baud, 8 data bits, and 1 stop bit, 147 msec

For appleworks, the interface Code = NONE

CHAPTER 1

Introduction

Congratulations on your purchase of the Sertech, SMT's Serial Interface card. The Sertech provides a two-way serial interface to a wide variety of peripheral devices, including serial printers, modems, terminals, plotters, and most other RS-232 type peripherals on the market today.

The Sertech comes with two connectors which adapt it to a variety of input/output devices. One connector adapts the card to Data Communication Equipment (DCE) devices. A modem is an example of a DCE device. The other connector adapts the card to Data Terminal Equipment (DTE) devices. Printers and terminals are DTE devices. Two-way communication is possible through either of the two connectors.

I. Compatibility

The Sertech serial interface card is compatible with all models of the Apple II microcomputer, the Franklin Ace, and other Apple "look alikes". It is compatible with the following operating systems: Applesoft, Integer Basic, Apple DOS, Pascal 1.1, and CP/M 2.23.

II. Firmware Options

Before you install the Sertech Serial Interface card in your Apple, there are two 8-position dip switches on the card that must be set. These switches, which are labeled SW1 and SW2 on the printed circuit board, select certain firmware options that configure the Sertech to the needs of your particular peripheral device.

Look at the card and locate the two dip switches labeled SW1 and SW2. The switches are in the upper left-hand corner of the card, as shown in Figure 1.

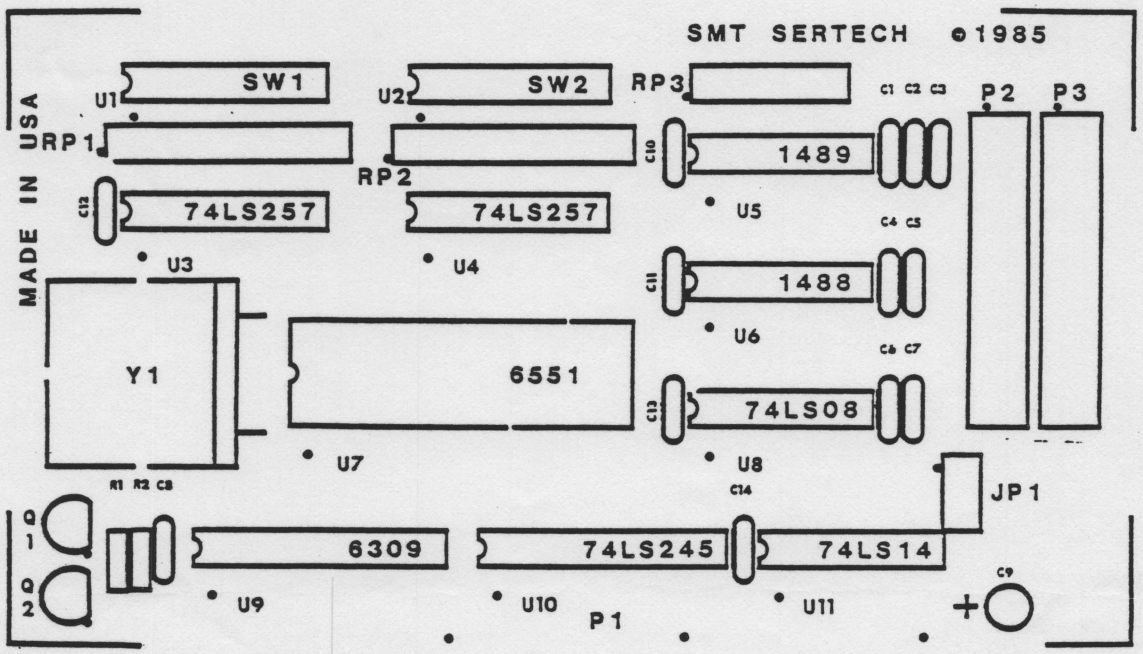


Figure 1

View of Sertech, showing SW1 and SW2

When you have located these switches, you are ready to begin configuring the Sertech Interface card to the needs of your peripheral device. You will need the manual for your device to look up several of the switch settings.

A) CARRIAGE RETURN DELAY. A carriage return delay is a short lapse in processing that gives the printer time to move its print head from the end of one line to the start of the next line. The first four switches on SW1 control the duration of this lapse. Refer to the manual for your peripheral device to determine the proper setting.

The table below shows the switch settings for the range of available carriage return delay times. If the delay time specified for your device does not equal one of these options, set the switches for the next higher delay time.

	SW1 Switches							
	Ø	2	3	4	5	6	7	8
MODEM → 0 msec	Off	On	On	On				
3 msec	On	Off	On	On				
6 msec	Off	Off	On	On				
11 msec	On	On	Off	On				
17 msce	Off	On	Off	On				
24 msec	On	Off	Off	On				
33 msec	Off	Off	Off	On				
43 msce	On	On	On	Off				
54 msec	Off	On	On	Off				
66 msec	On	Off	On	Off				
80 msec	Off	Off	On	Off				
95 msec	On	On	Off	Off				
111 msec	Off	On	Off	Off				
128 msec	On	Off	Off	Off				
147 msec	Off	Off	Off	Off				

B) BAUD RATE. Baud rate is the speed at which data travels into or out of a device. The speed is expressed in bits per second. The last four switches on SW1 control the baud rate. Fifteen different rates are available. The table below shows the switch positions for the available baud rates. Check the manual for your peripheral device to determine the appropriate baud rate setting. If the device has multiple baud rates, be sure that the Sertech card is set to the same baud rate as the device.

	SW1 Switches							
	1	2	3	4	5	6	7	8
50 baud					Off	On	On	On
75 baud					On	Off	On	On
110 baud					Off	Off	On	On
135 baud					On	On	Off	On
150 baud					Off	On	Off	On
300 baud					On	Off	Off	On
600 baud					Off	Off	Off	On
1200 baud					On	On	On	Off
1800 baud					Off	On	On	Off
Modem -> 2400 baud					On	Off	On	Off
3600 baud					Off	Off	On	Off
4800 baud					On	On	Off	Off
7200 baud					Off	On	Off	Off
9600 baud					On	Off	Off	Off
19200 baud					Off	Off	Off	Off

C) VIDEO ECHO: Video echo is a display condition in which all data sent to the printer also appears on the screen. The first switch on SW2 controls the Video Echo option. Some devices require a video echo. Check the manual for your peripheral device to see if video echo is required.

	SW2 Switches							
	1	2	3	4	5	6	7	8
No Video Echo	On							
Video Echo On	Off							

D) PARITY TYPE. Parity is a condition that is met when a certain number of bits in a byte are on. Parity is used for checking accuracy when data is transferred from one location to another. The next three switches on SW2 are used to set the parity type. Check the manual for your peripheral device to determine the appropriate parity setting. The table below shows the switch settings for the various types of parity that are available:

	SW2 Switches							
	1	2	3	4	5	6	7	8
No Parity		On	On	On				
Odd Parity		Off	On	On				
Even Parity		Off	Off	On				
Mark Parity		Off	On	Off				
Space Parity		Off	Off	Off				

E) AUTO LINE FEED. Line feed refers to the advancement of paper in a printer each time a carriage return indicates the start of a new line. Line feed characters can be made automatic. When line feed is automatic, the carriage return initiates a line feed automatically. The fifth switch on SW2 controls the automatic line feed option. When this option is selected, the Sertech card sends a line feed character with every carriage return that it sends to the peripheral device. Check the manual for your peripheral device to see if this is necessary.

The options are on and off. The switch in the "on" position selects the card for no automatic line feed. See the table below:

	SW2 Switches							
	1	2	3	4	5	6	7	8
No Auto Line Feed					On			
→ Auto Line Feed On					Off			

F) DATA LENGTH. Data length refers to the number of bits in a byte. The next two switches (6 and 7) on SW2 control the Data Length option. Check the manual for your peripheral device to determine the correct setting for data length.

The table below shows the switch settings for the data length options that are available:

	SW2 Switches							
	1	2	3	4	5	6	7	8
5 bits						Off	Off	
6 bits						Off	On	
7 bits						On	Off	
→ 8 bits						On	On	

G) NUMBER OF STOP BITS. A stop bit is a signal that marks the end of a character in a string of data bits. The last switch (8) on SW2 controls the option for the number of stop bits. Check the manual for your peripheral device to determine the correct setting for this option. The table below shows the switch settings for the available stop bit options:

	SW2 Switches							
	1	2	3	4	5	6	7	8
→ 1 Stop Bit								On
2 Stop Bits								Off

V. Polarity Jumper

The polarity of DCD (Data Carrier Detect) signals going to and from the Sertech must be set by means of a hardware jumper. The location of this jumper is shown in Figure 2 as JP1 (Lower right hand corner).

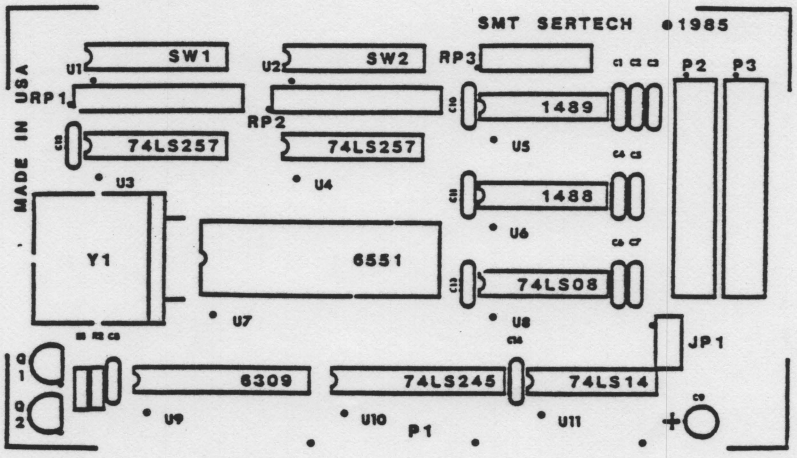


Fig. 2

The jumper can be configured in one of two ways:

Modem → Configuration #1 Jumper between the center and top pin. for normal operation

Configuration #2 Jumper between the center and bottom pin.

Configuration #1 sets the polarity to "high level". This means that a high signal on pin 15 of the DB-25 (Pin 8 of connector P2) or a high signal on pin 21 of the DB-25 (Pin 11 of connector P3) will allow the Sertech to receive data from the modem or other Data Communication Device.

Configuration #2 sets the polarity to "low level". This means that a low signal on pin 15 of the DB-25 (Pin 8 of connector P2) or a low signal on Pin 21 of the DB-25 (Pin 11 of connector P3) will allow the Sertech to receive data from the modem or other Data Communication Device.

If no signal is connected to pin 15 (8) of P2 or pin 21 (11) of P3, then jumper configuration #1 must be used.

NOTE: In discussing the status of signals, the following conventions are observed.

Mark (low level) = OFF = LOGIC "0" : -12 to -3V

Space (high level) = ON = LOGIC "1" : +12 to +3V

CHAPTER 2

Installation

Now that the dip switches are set, you are ready to install the Sertech in your Apple computer. The Sertech Serial Interface card has been designed with convenience in mind. Installation requires no modifications to your computer, and takes about five minutes.

I. Turn Off the Power

First, TURN OFF THE POWER on your Apple computer. This is very important. Do not unplug the Apple, just turn it off. If you unplug the Apple, you will isolate it from earth ground and leave it vulnerable to static discharges.

Place the Sertech card on the table in front of you with the chip side up. Handle the card as you would an expensive phonograph record. Grasp it only by the corners or edges, and do not touch the components or pins, especially the gold fingers on the edge connector. Make sure that the gold fingers are pointing toward you. You should now be able to see the row of gold fingers at the bottom on the right.

II. Connect Flat Ribbon Cable

The Sertech Serial Interface comes in two pieces: the actual printed circuit card, and a flat ribbon cable. These two pieces must be joined together by plugging the pins of the card into the connector on the end of the flat ribbon cable.

Locate the flat ribbon cable. It looks like the drawing in Figure 3. One end is a 25-pin D-type connector, and the other end is a rectangular 26-pin header connector.

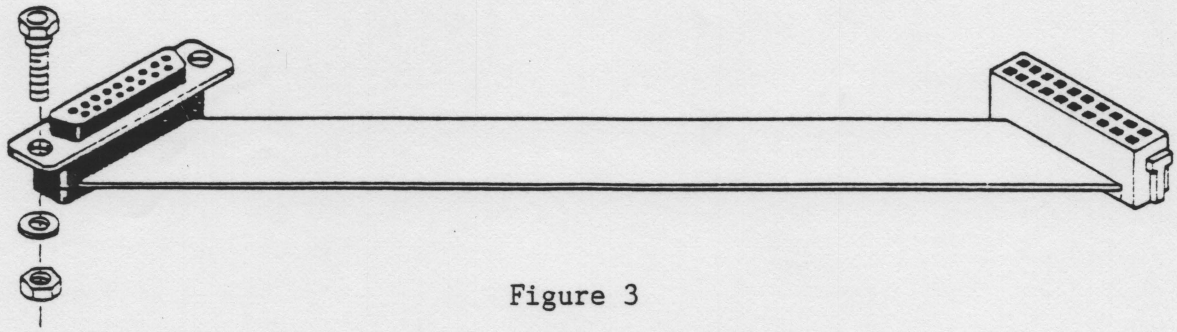


Figure 3

Flat Ribbon Cable

When you have located this cable, refer again to the Sertech on the table in front of you. With the card positioned correctly as before, find the two sets of pins labeled P2 and P3 at the extreme right edge of the card.

If you are connecting your Sertech card to a communication (DCE) device, such as a modem, you will connect the flat ribbon cable to the set of pins labeled P2. If you are connecting the card to a terminal (DTE) device, such as a terminal or printer, you will connect the flat ribbon cable to the set of pins labeled P3. Remember, P2 for modems; P3 for printers and terminals.

Lift the card in your left hand with the chips side up and the pins on the card facing toward you. In your right hand, pick up the rectangular 26-pin header-type female connector of the flat ribbon cable and place it gently but firmly onto the correct set of pins, either P2 or P3. This should be done with the cable extending to your right.

The cable SHOULD NOT CURVE BACK AND COVER ANY COMPONENTS ON THE CARD. If it does, it is on backwards and should be turned around.

See the picture in Figure 4 for the correct positioning of the flat ribbon cable.

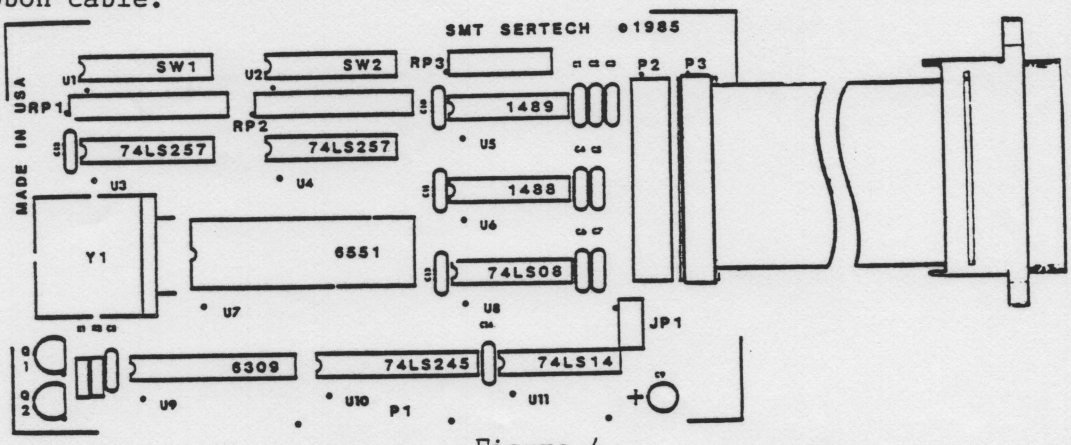


Figure 4

Picture of Sertech with Flat Ribbon Cable attached.

III. Insert Card in Apple

Remove the cover from the Apple computer. When you are standing in front of the computer facing the keyboard, you see eight (8) slots. The slots are numbered 0 to 7. The Apple IIe has seven numbered slots and an aux connector slot.

Plug the Sertech Serial card in any slot except Slot 0. If possible, use Slot #1, Slot #2, or Slot #3, as these are the most commonly used slots.

If you are using Pascal or CP/M on your computer, you must use certain slots for certain devices. If you are using Pascal or CP/M, see the following tables.

For This Device:	----Under CP/M----	-----Under Pascal----
Printer (List Device)	Slot #1 (LST:)	#1 (PRINTER:)
Modem (Reader & Punch)	Slot #2 (PUN:/RDR:)	#2 (REMIN:/REMOUT:)
Console	Slot #3 (CON:)	#3 (CONSOLE:)

Gently but firmly seat the card into its slot with the chips facing to the right, and the cable extending to the rear of the computer. Line the gold fingers of the Sertech card up with the slot in the Apple, and press it carefully into the slot. Rock the card gently from front to back to get it started. Then press down and seat the card firmly into the socket.

Wiggle the card from front to back to get it firmly seated, but never wiggle the card from side to side. This could weaken the connector slot and possibly break a connection. There is only one correct way to install the Sertech Serial Interface in the Apple computer.

Drape the cable through one of the slits in the back of the case, and replace the cover on the Apple computer. Now mount the 25-pin D-type connector to the Apple case, using the hardware supplied.

IV. Plug the Device Cable into the Flat Ribbon Cable

Make sure the power to your printer, terminal, or modem is off. Plug the 25-pin D-type connector at the end of your device cable into the flat ribbon cable that is now mounted in the rear case of the computer. Plug the other end of the device cable into your peripheral device.

V. Power Up

Double check your installation of the Sertech Interface card. When you are sure that all the steps have been performed correctly, turn the power on to both the peripheral device and the Apple.

Chapter 3

Serial Data Communication

I. Background

Serial data transfer is very popular, especially where the data travels over long distances. It is less expensive than parallel data transfer since only two lines are necessary rather than eight. Because serial data transfer is popular, the manufacturers of communication equipment formed an association to agree upon standard ways of sending and receiving serial data. The most widely used standard is called Revision C of standard RS-232, or RS-232-C. The Sertech Serial Interface card sends and receives data in a manner that generally fits the guidelines of this standard.

II. Connector Pin Assignments

The two diagrams on Figure 5 list the signals assigned to the connector pins on both ends of the flat ribbon cable. Figure 5a shows the pinout assignments for P2, the modem connector; Figure 5b shows the pinout assignments for P3, the printer and terminal connector.

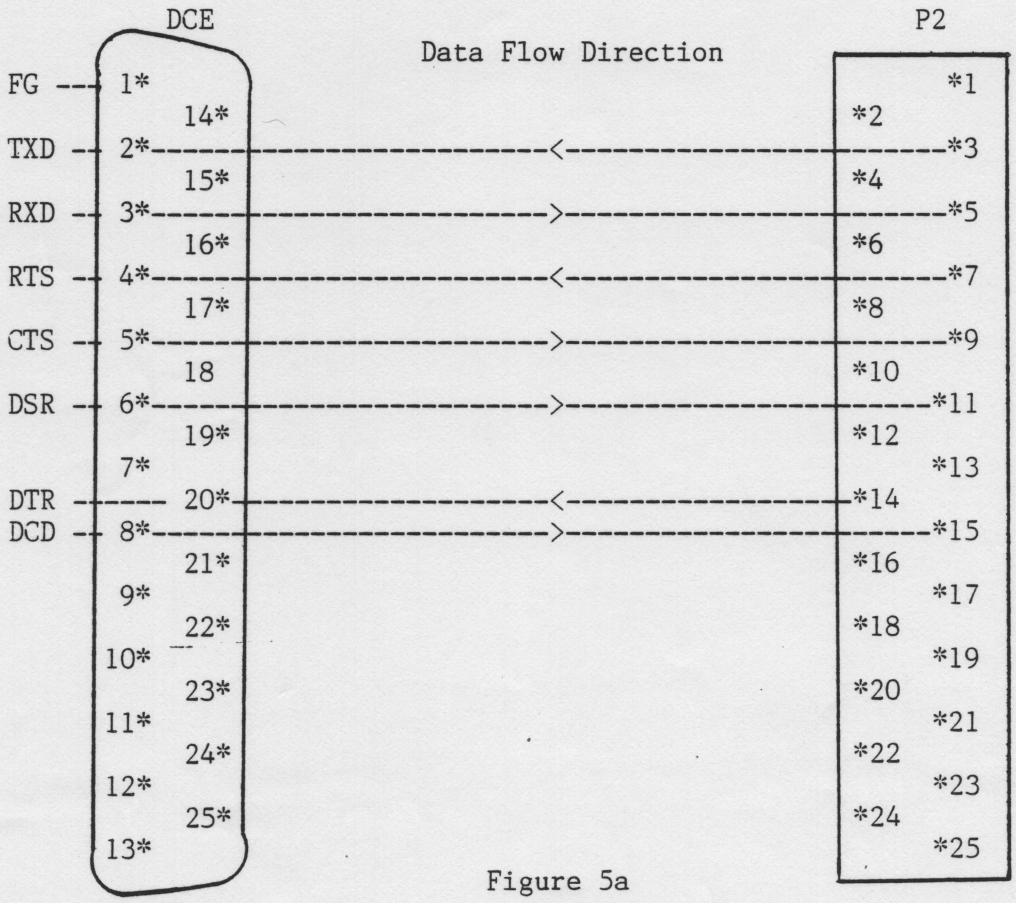


Figure 5a

Pinout-Signal Table for Modem Connector P2

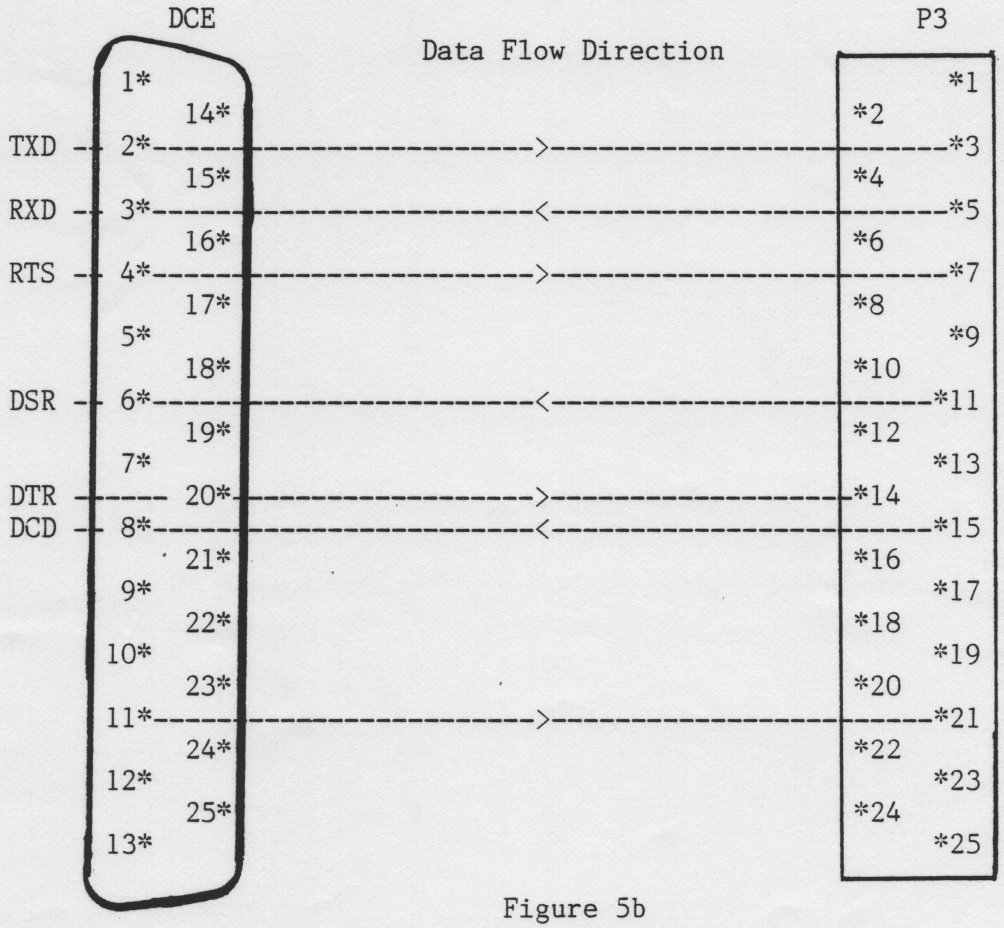


Figure 5b

Pinout-Signal Table for Printer and Terminal Connector P3

III. Modems

The above signals are passed back and forth between the Apple computer and a modem when the Apple is communicating with a remote peripheral device by way of the modem. The Sertech interface card handles the sending and receiving of these signals.

The modem has two jobs. In fact, the word modem is a shortened form of two words that describe what the modem does. Modem stands for MOdulator/DEModulator. As a modulator, the modem takes electrical signals from the computer and turns them into audible tones that travel over telephone lines. As a demodulator, it does the opposite. It takes the audible tones from the telephone line and turns them back into electrical signals that the computer can interpret.

In this way, the modem sends and receives both data and control signals that regulate the flow of data.

IV. The ACIA

The heart of the Sertech interface card is the Asynchronous Communications Interface Adaptor, or ACIA. This is the chip on the card that converts parallel data to serial data and vice versa. It also controls hardware handshaking between the Apple and the device to which the Sertech is connected.

The following table lists the signals that the ACIA sends to the pins at P2 ad P3. The pin numbers that are not in parentheses refer to the pins on connectors P2 and P3. The pin numbers in parentheses refer to the pins on the DB-25 connector at the end of the flat ribbon cable.

Signal Descriptions

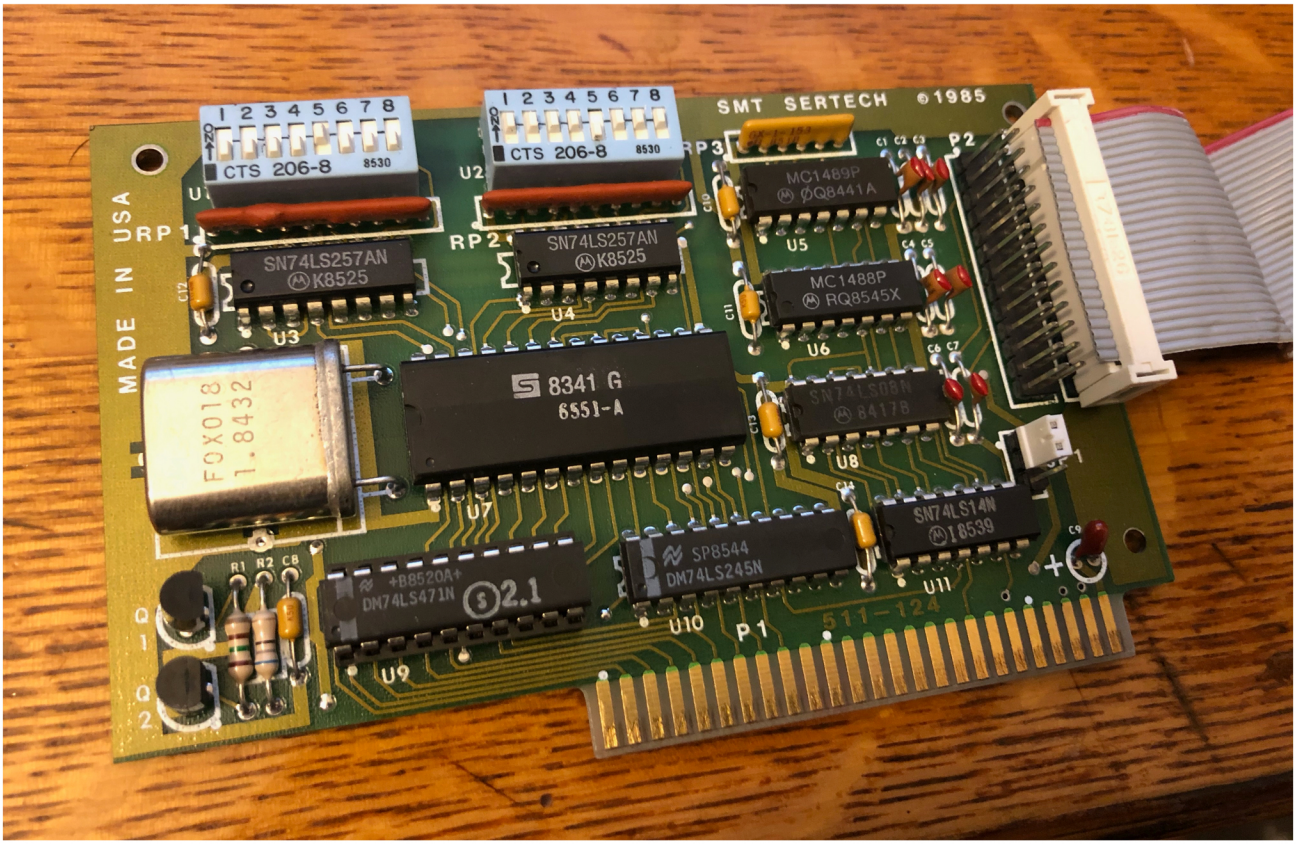
Signal at ACIA	P2 (Modem Connector)	P3 (Printer Connector)
Transmit data	Transmit Data 3(2)	Receive Data 5(3)
Receive data	Receive Data 5(3)	Transmit Data 3(2)
Data Term. Ready	Data Term. Ready 14(20)	Data Set Ready 11(6)
Request to Send	Request to Send 7(4)	Data Carrier Detect 15(8)
Data Car. Detect	Data Car. Detect 15(8)	Supervis. Send Data 21(11)
Clear to Send	Clear to Send 9(5)	Request to Send 7(4)
Data Set Ready	Data Set Ready 11(6)	Data Term. Ready 14(20)

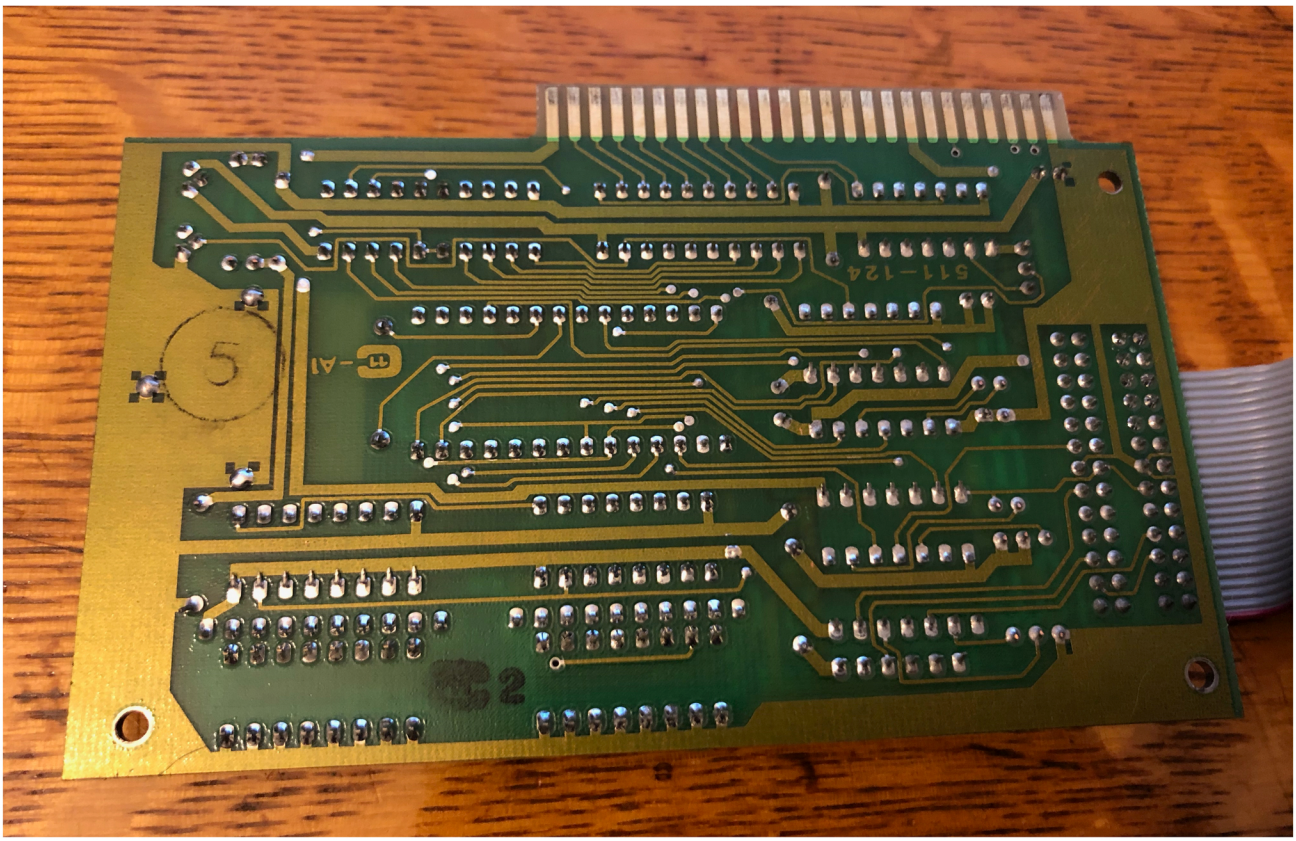
Appendix A

Troubleshooting Guide

Problem	Solution
Every letter appears twice. DDOOUUBBLLEE LLEETTEERRSS	Turn on (No Video Echo.) (First Switch on SW2)
No data transfer at all.	Check cable connections.
Characters are garbled.	a) Check baud rate. b) Check to see that device is turned on, on-line, working, etc. c) Check data length. d) Check parity setting.
Paper not advancing.	Turn off No Auto Line Feed. (Fifth Switch on SW2)
Printer is skipping too many lines.	Turn on No auto Line Feed. (Fifth Switch on SW2)
Keyboard and screen dead.	Under Pascal and CP/M, Slot #3 must be the console device.
Nothing typed is displayed.	Turn off No Video Echo. (First Switch on SW2)

Photos of Serial Card





Scan of manual and photos provided by Steve of Mac84.net

YouTube.com/Mac84

@Mac84tv

October 10, 2020